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NPIC/TSSG/DED-1076-68
13 February 1968

MEMORANDUM FOR: Acting Chief, Development & Engineering Division, TSSG
THROUGH : Acting Chief, Exploitation Systems Branch, DED
SUBJECT : Contract [REDACTED]

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1. On Thursday, 8 February 1968, [REDACTED] and the undersigned visited [REDACTED] to review the optical design of the subject contract. After an extensive review of the details of both the optical design itself and the methods and techniques for evaluating its performance, [REDACTED] stated in no uncertain terms that he knew of no one in the country that could do a better or more complete job. He stated that all of the techniques being used were the most advanced and were at the edge of the state-of-the-art.

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2. After reviewing the NOD 100, [REDACTED] stated that he believed that the present design will give the performance characteristics indicated in the Status Report dated 10 January 1968. He made the following qualifications.

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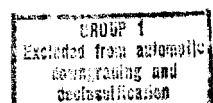
a. The optical design is certainly not complete without a completed condenser design.

b. He is not sure that the MTF analysis is valid when the MTF curve reaches a minimum above 5% MTF and then rises again before it crosses the 5% cut-off limit. He is sure (as indicated by the actual performance of the NOD 100 under similar circumstances) that the viewer will resolve a sine wave target at the spatial frequencies between the minimum and the cut-off frequencies; but, he is not sure how this will effect a complex target such as an aerial image. In other words, he cannot assign a confidence factor to the ability of the MTR analysis to predict image interpretability.

3. Even after reviewing the NOD 100, which [REDACTED] thought quite highly of, he was unable to make any estimation whether the NOD 110 design would be a significant improvement over the NOD 100. The design of the NOD 110 indicates that its optical performance characteristics will be at least double (practically triple at the edge at the high magnification values) those of the NOD 100 except in off-axis low zoom range, but even

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25X1 with this in mind [REDACTED] stated that he could not predict whether the NOD 110 would appear to a photo interpreter in an operational environment to be significant improvement. Initially, he suggested using the NOD 100 in our operational environment to try to determine the PI's reaction to such a device; however, after being reminded of the negative predigest that is often formed when the PI is introduced to a device which "has elements that he must ignore because they will be corrected" he changed his thinking to the point of view of not recommending the use of the NOD 100.

4. Other areas that were explored that appear to have no empirical exploration are the following:

a. There is no "evidence" to show that a zoom projector will be more efficient over that of a fixed magnification viewer (which can inherently be designed to have higher off-axis optical performance characteristics. The zoom design is diffraction limited on-axis).

b. There is no "evidence" that rear projection viewers are more efficient than direct viewing equipment. In both cases "evidence" means there has been no empirical study made.

5. It was learned that the MTF of the screen was not considered in the optical performance predictions. This appears to not be of significant concern because it was likewise not considered in the NOD 100 prediction and the measured optical performance of that instrument was higher than that predicted. Notwithstanding these factors, the undersigned will attempt to furnish to [REDACTED] the MTF analysis of existing screens developed by Corning.

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6. After reviewing the new optical performance data that consisted of an evaluation of the NOD 10 system under white light conditions, a meeting was held on Friday, 9 February 1968, at the [REDACTED] facility. In attendance were [REDACTED]

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25X1 25X1 [REDACTED] and the undersigned from NPIC. The previous day's discussion was reviewed then the philosophy of the viewer was discussed. The opinion was expressed that the viewer was being developed for a future system producing 9 1/2 inch wide imagery; therefore, the performance must be extremely high at the scanning magnification of approximately 3X, because there is no higher probability of a target appearing on-axis than at the edge of the film. The white light data indicates that the low zoom range of 3X to 30X has about the same edge

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performance characteristics as that of the NOD .00 and this is certainly not acceptable. It was pointed out that even though 9 1/2 inch material will probably be the largest input, the system must accommodate all widths between that and the 70mm size.

7. With the basic unacceptability of the present optical design, [REDACTED] will reinvestigate the Company position regarding further attempts to increase the performance. Such approaches may be to change the zoom ranges to 3X to 18X and from 12X to 70X. [REDACTED] agreed to have a decision by Friday, 16 February 1968.

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[REDACTED]
ESB/DED/TSSG

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for Action - 9 Feb 68 Carol pls log for

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ms

MEMORANDUM FOR [redacted]

As earlier indicated, I had
lunch today with [redacted]

[redacted], et al. or

[redacted]. They
are very interested in VIEWER
contract and problem of guessing
how many might be needed

(over)

(DATE)

FORM NO. 101 REPLACES FORM 10-101
1 AUG 54 WHICH MAY BE USED.

1/18/68 (47)

I indicated that we were
both dependent on results
of the analysis of the
Zoom Lens for Phase I before
Phase II. They think it will
be fine for us and really hope
to get some idea how many
viewers NDIC and community
might want. Will discuss with [redacted]

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